X-ray split and delay system for soft x-rays at LCLS

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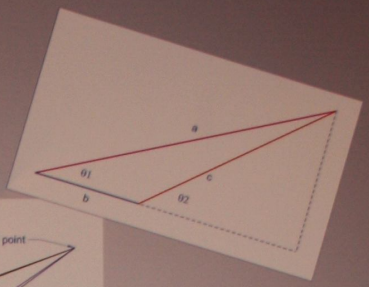
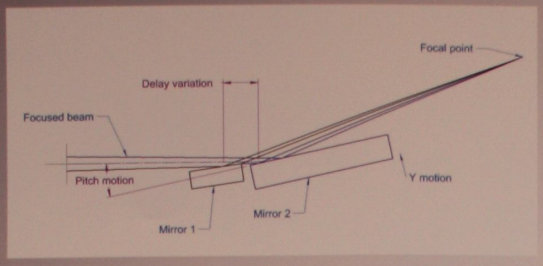
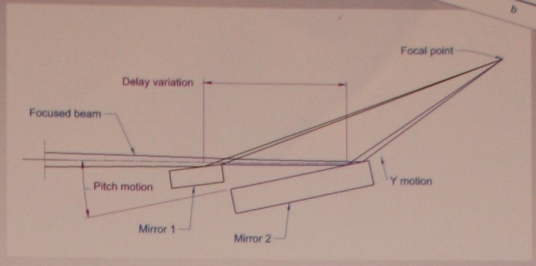
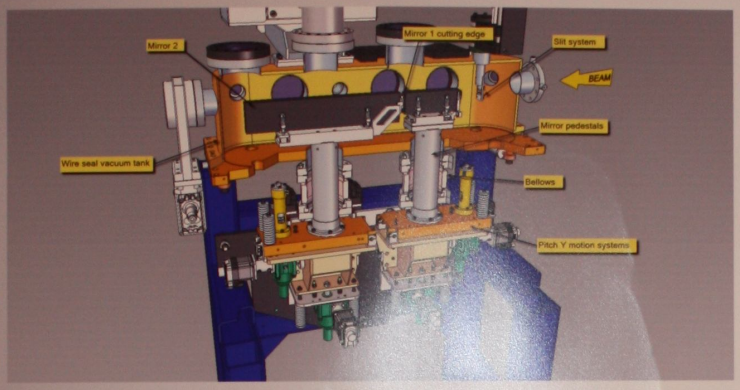
General concept

- The X-Ray beam is split in 2 longitudinal slices that follow different path lengths
- A delay is introduced between the 2 half beam paths.
- The delay can be controlled by varying the vertical position and pitch angle of the mirrors
- Path length differential. $\Delta = ab\,\theta 1^2/2(a-b)$



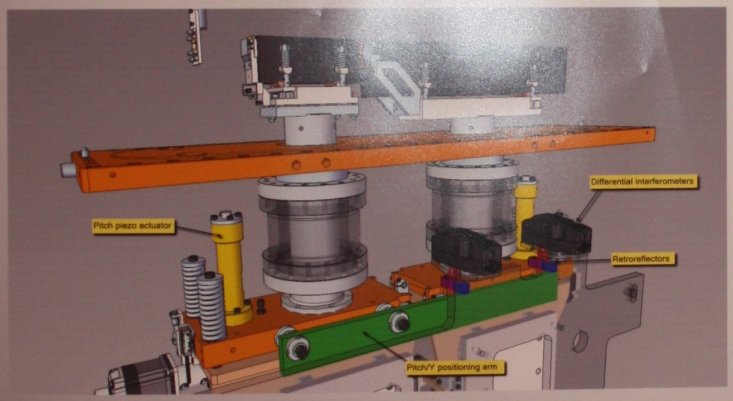






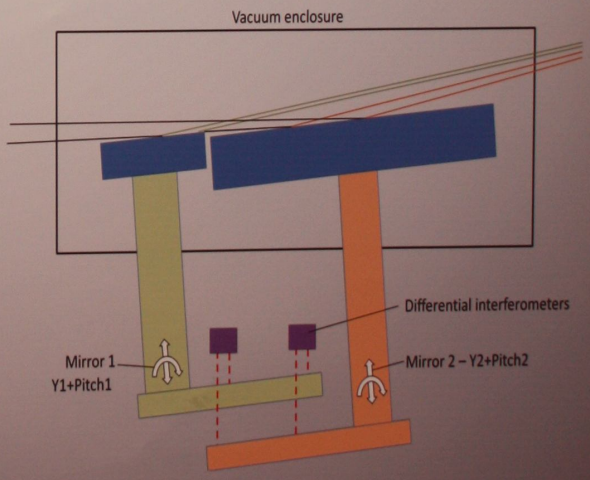
General description

- Both mirrors are installed in one common tank
- Individual pedestals are linked to out of vacuum linear and pitch motions
- All controls are out of vacuum – Aimed vacuum 10^{-10}torr
- Mirror pedestals and motions devices are independent from tank support.



Motion controls

- The combined mirror motion for vertical and pitch positioning is controlled by a set of 2 out of vacuum differential interferometers.
- Interferometers coupled to a combination of stepper motor linear stages and piezo actuators control the pitch motion of each mirror with resolution of 0.25 µrad
- Overlap in the interaction is verified through diagnostics in the experimental chamber



Key values	
Energy range	500 to 2000 ev
Delay range	0 to 100fs
Resulting KB focal length	2.2 m
Pump probe ratio	0 to 100%
Beam incidence on 1st mirror	11.5 mrad
Mirrors material	Non coated Si
Mirror pitch resolution	0.25 µrad
Mirror 1 dimensions	**L150**-W25-H60mm
Mirror 2 dimensions	**L400**-W25-H80mm
Vacuum level	10^{-10} torr

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